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## Open Access



# Empirical Analysis of Farmers Preferences and Willingness towards Organic Farming in Gilgit-Baltistan, Pakistan

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## Abstract

**Background:** Organic farming is an eco-friendly approach in the agricultural production system that ensures food safety, reduces health problems, promotes environmental conservation, and generates employment opportunities for local communities.

**Methods:** The survey was conducted using a well-structured questionnaire that focused on the scope and potential of organic farming in Gilgit-Baltistan (GB), Pakistan. The data were collected from randomly selected 150 respondents in nine districts of GB between May and June (2019). This survey analyzed the factors influencing the willingness of farmers to pay attention to organic farming and evaluated the possibilities of espousal organic farming as an effective approach.

**Results:** In general, mixed perceptions were revealed by the behavior and attitudes of the farmers, however, it is necessary to notice the intentions of the farmers for substitute methods to make organic farming feasible. Based on the survey, people were not reluctant to adopt organic farming to ensure better market value for their products. As a result, they will sustainably get a better livelihood.

**Conclusion:** The current study is concluded that the espousal of organic farming could have a positive and noteworthy outcome on a farmer's life in terms of profitability, compatibility, productivity, and sustainability in GB. There is a dire need for organic certification to increase the market value both at local and international levels.



## Introduction

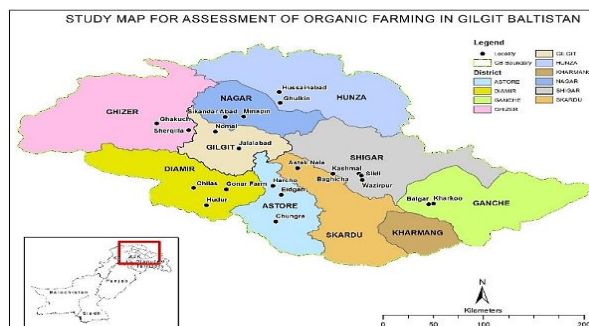
Organic agriculture is a holistic system considered to sustain and enhance the profitability of organic yield [1]. Organic farming is a sustainable approach that has a positive impact on the environment and health of human beings and wildlife because no agrochemicals such as pesticides, insecticides, herbicides and synthetic fertilizers are used as compared to conventional farming [2]. Hence, organic farming embraces medium and long-term effects on agro-ecosystem via biodiversity conservation, relying on resistant varieties, crop rotation, preserving soil fertility, recycling organic materials/crop residues, and eliminating risky agrochemicals [3]. Sustainable agriculture and organic farming are correlated, as organic farming is the system based on the regeneration of environmental processes and strengthening of ecological functions to produce healthy food by natural means [4]. The main objective of organic production is to advance a sound management system that is sustainable and harmonious with the environment. In terms of environmental benefits, organic farming has been showing to enrich soil fertility and reduce soil degradation, increase and wild agrobiodiversity that retains biological and physical characteristics of the soil (like reduced nitrate leaching and improved wildlife habitat), hence showing less dependency on external inputs [5,6]. It is evident that embracing organic farming not only generates employment opportunities for local people and increases the farmers' income but also conserves the environment by avoiding toxic chemical fertilizers/pesticides, reducing health problems. Subsequently, the demand for organic products is elevating gradually across the globe with positive attitudes [7]. Organic food is considered healthier as compared to the food obtained by conventional farming, it may contain more antioxidants (polyphenols) and nutrients than non-organic food by reducing exposure to artificial agrochemicals (i.e., pesticides, herbicides, insecticides, synthetic fertilizers) [8,9]. Over 500 plant species from the two highest-ranked families (Asteraceae Fabaceae) have been recognized to have medicinal value, these plant medicines are trusted and found to be highly effective by the locals of GB [10,11]. Thus, organic food is being rich in nutrients, antioxidants, antibacterial, and antifungal qualities considered remedial for many health issues (ulcers, anemia and menorrhagia) [12]. Despite the benefits of organic commodities consumption, information regarding organic food production, market demand, and supply scenarios seem to be very scanty. To promote organic food cultivation and to reduce the health hazards that arise from the production and consumption of inorganic food, nationwide advertising and promotional campaigns favorable option.

The objective of the current study is to analyze the factors that influence the willingness along with preferences of growers/respondents for organic farming as a sustainable approach in Gilgit-Baltistan, Pakistan.

## Methods

### Survey and Analysis

The survey was designed to assess the factors influencing the implementation and potential of organic farming in different agricultural areas of Gilgit-Baltistan (GB), Pakistan. For this purpose, 9 out of 10 districts of GB were surveyed between May and June 2019 by WWF-Pakistan (Fig.1). Focus Group Discussions (FGD) were conducted through semi-structured questionnaires to obtain knowledge, understanding, and information about the horticulture supply chain. For this, a well-developed structured questionnaire of about twelve pages was made to assemble primary data from the farmers (individuals) in the respective areas. A format of the questionnaire was designed to assess three aspects of the organic farming potential among the farmers in GB. The first part was related to the analysis of the general descriptive information including age, education, experience, land holdings, and district-related questions. The second part focused on the degree of respondents' knowledge and practices in the districts and the last part explored the farmers' behaviors and attitudes toward organic farming and organic foods.



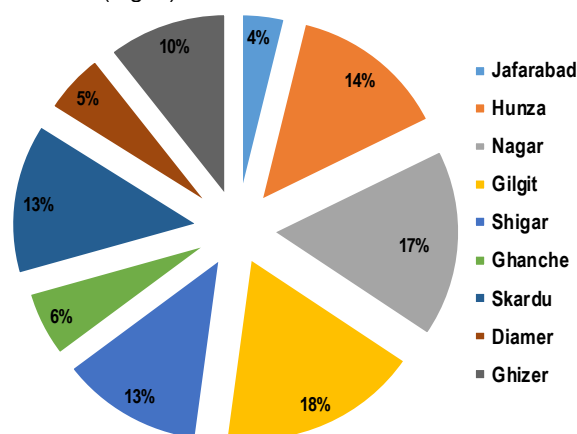
**Figure 1:** GIS Image of the area selected to survey the potential of organic farming in Gilgit-Baltistan (GB) by WWF-Pakistan.

This study was restricted to a limited number of sample sizes due to a short period, language barrier, and remote area constraints. Data from different primary sources (i.e. farmers, laborers, traders, and market processors) were collected at various levels. A questionnaire was distributed among more than 250 respondents and 150 valid questionnaires were selected based on the complete information received. This survey also helped in the identification of gaps and costs incurred in all processing stages from the farm up to marketing and consumption. The survey data were assembled using the Statistical Package of Social Science (SPSS) version 16.

## Results

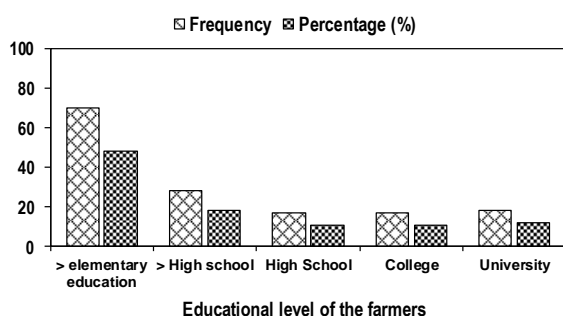
The survey data displayed the willingness and potential of organic farming in GB, which showed mixed interest for organic farming some promising and few alarming trends. Since GB has a difficult terrain that spans almost the entire region; it was hard to access some districts more than the others. The response rate from each of the districts depended upon several underlying factors such as weather variability, size of a population and accessibility to the location. The survey questionnaires were well-received from most of the parts of GB but there was a general reluctance on part of the locals to answer

questions about land holding, property, and family composition. Therefore, cultural values and the general attitude of people toward providing information were affected by the response rate. The highest response rate was observed in the Gilgit district (18%) followed by the districts of Nagar (17%), Hunza (14%), and Skardu (13%). While the lowest response rate was noticed at Jafarabad where approximately 4% of responses were recorded (Fig. 2).



**Figure 2:** District-wise responses (%) of respondents in Gilgit-Baltistan.

The education level of the farmers was queried, as education affects the knowledge and understanding of conventional farming techniques viz., cropping pattern, optimal use of fertilizers and pesticides to keep land fertile. The analysis showed 150 valid respondents out of which 48.2% of the farmers' population received less than elementary education, 18.4% of the farmers from the sample had formal education (elementary to high school), while 33.4% of the growers/farmers have considered being educated (high school to university education) (Fig. 3). It was observed agricultural know-how was greater in the upper ranges but among youth, formal education in agriculture was a rising trend and conducive to better farming practices.



**Figure 3:** Education level among the farmers in Gilgit-Baltistan

A survey concerning the age range of farmers showed that about 40% of the samples were ranged from 36-50 years old and 34.8% of the farmers were above 50 years old, while 25.3% were young farmers (21-30 years old) (Table 1). In GB, the landholding unit is measured in Kanal rather than hectares or acres. According to the

survey on the landholding capacity of the farmers was displayed that about 53% of the farmers owned 06-20 Kanals land areas followed by 28% of farmers owning 21-50 Kanals of land, while only 5% of the farmers had 50< Kanals of the agriculture land. Besides, general farming experience among the natives of GB varied, and most of the respondents had noteworthy farming experience. The maximum farming experience of 21-30 years was exhibited by 26% of the farmers and 20.2% of the growers had 36-40 years of farming experience, while 15.2% of the farmers had more than 45 years of experience. Besides, there are few responses at the lower range, about 0.6% of farmers had <5 years of farming experience which partially revealed the occupational shift prevalent in the youth. Anyhow, almost all families practiced agriculture at a subsistence level (Table 1).

Farmer's age							
Age range of the farmers (years)	15-25	26-35	36-45	51-60	60		
Frequency	13	22	60	28	27		
Percentage (%)	8.2	17.1	39.9	17.7	17.1		
Farmer's total land property (Kanal)							
Land holding area (Kanal)	1-5	6-10	11-20	21-30	31-40	41-50	50
Frequency	22	42	39	14	14	11	8
Percentage (%)	13.9	26.6	26.4	10.8	8.9	8.3	5.1
Farmer's general farming experience							
Farming experience (years)	5-10	11-20	21-30	31-40	41-45	45	
Frequency	14	36	35	30	11	24	
Percentage (%)	8.8	22.8	26.0	20.2	7.0	15.2	

**Table 1:** A descriptive study of farmers' age, landholding, and farming experience in Gilgit-Baltistan.

Surprisingly, a majority of the respondents when approached by WWF, revealed that 66.9% of farmers had knowledge regarding organic farming, and 33.1% of them had heard about organic farming for the first time. The basic input procurements of the farmers in GB included seeds, synthetic fertilizers, and pesticides. Moreover, 81.0% of farmers were unfamiliar with soil analysis and 67.7% with water analysis. Upon inquiring further, it was revealed that the Green Revolution of the 1960s had educated farmers about the use of synthetic inputs to improve yields and reduce the cost and time for crop production. The application of fertilizer has improved crop yield at both subsistence and commercial levels, which were commonly used by locals for vegetation in their lands even on small scales. About 93.7% of the farmers used inorganic fertilizers mostly in the form of urea and DAP (diammonium phosphate) to preserve the fertility of the soil. According to our

assessment for pest management, 86.7% of farmers were not familiar with biological or organic control methods, as well as 95.6% of respondents were also not familiar with integrated pest management, hence the basic way of controlling pest and diseases of vegetables, fruits, and cereals were with the use of pesticides and chemicals rather than biological and organic. Besides, in the case of non-chemical methods for plant protection, different ways such as with the means of mechanical, physical, or using pheromone traps and biological enemies were used by 33.5%, 5.7%, and 10.1% of respondents, respectively. According to our assessment, almost 22% of the farmers have practiced crop rotation and intercropping and 63.9% of farmers integrated legumes as green manure while the rest of the farmers were unfamiliar with intercropping method.

The third aspect of this survey included farmers' behavior and attitude towards organic farming in GB. When questioned about their intentions of reverting to organic farming in the next five years, about 80.0% of respondents were positively agreed with organic farming and they were agreed that organic farming is the step back to the farming of the past. Likewise, 96.6% of the farmers' population replied that organic farming is more in line with nature and safer than conventional produce. However, according to survey analysis, 50.0% of the farmers said that local markets were available for organic products in GB. As per our assessment, about 78.4% of respondents have known about the low yields produced by organic farming and also about 55.6% of local consumers were available to pay a higher price for organic products. Moreover, producing organic yield will have greater health benefits on farmers' families agreed by 91.4% of respondents. Likewise, the majority of the respondents (63.6%) were agreed that organic produce is more profitable than conventional crops, and 59.0% of farmers said that organic products would be sold for a higher price as compared to conventional products which significantly points in the direction of organic potential in the region. Despite the advantages of organic farming, about 69.8% of growers also believed that chemical inputs (fertilizers and pesticides) improved the quantity and quality (appearance) of the products. About 87.0% of farmers believed that organic products save on the production cost of fertilizers and pesticides by using organic pesticides and manures.

Farmers were also asked questions related to the practicality of organic farming in the province, effectively 88.6% of the growers agreed that soil fertility and soil structure can be improved by producing organic fruits and vegetables by conserving the environment. Some farmers were concerned about the soil quality for organic farming, as the prevalent application of fertilizers and pesticides has rendered the soil unsuitable for organic farming. Based on the preferences of farmers 56.5% supposed a shift to organic farming would be 'not risky' while about 29.9% of growers believed that a shift towards organic farming is 'risky' and the remaining 13.6% of farmers were neither agreed nor disagree for organic farming. However, the associated risks include low yields, pest attacks, and uncompetitive prices of the product in the market as compared to conventional

produce. Almost 66.7% of the farmers agreed that consultancy and advice regarding organic farming were difficult to attain and acquiring information about organic farming was a cumbersome process so some respondents showed a fallback toward shifting to organic farming. Besides, the majority of the respondents (77.4%) discussed that programs that could educate about the merits of organic farming and its implementation were too few. Likewise, 85.3% of growers have given positive responses if they find the possibility to access the information sources about organic farming, they will opt for organic farming. Focus group discussions revealed that up to 81.8% of farmers supposed that they will meet the level of work needed for organic farming in upcoming years and have technical abilities to collectively work with other farmers to pave way for the prevalence of organic agriculture in the region. Farmers also found it hard to find value chain actors downstream such as buyers and wholesalers who would carry organic products further down the value chain. Similarly, farmers in GB find it hard to access information about export markets for their products because it is hard to find traders who pay a high price. It was also observed that infrastructural limits prevented some farmers to carry out organic farming in hilly areas, as farmers lack resources to transport water uphill for irrigation. So, special attention, if provided by the government and other institutions in this area can considerably improve the local supply market of organic products.

## Discussion

In Gilgit-Baltistan (GB) major crops are grown i.e., wheat, maize, potato, barley, buckwheat, peas, beans and vegetables. While the double cropping zone exists at 1900 meters or above where two crops are grown interchangeably, or seasonally. Agriculture is part and parcel of the heritage for the locals, as generations of farmers continue to impart knowledge to their progeny. For this research, the education level of the farmers was asked as education has been observed to affect the knowledge and understanding of conventional farming tools and techniques such as the optimal use of fertilizers, pesticides and cropping techniques to keep land fertile [13]. The Economic Survey of Pakistan 2019 Federal Ministry of Education 2019 has shown the adult literacy rate has increased to 60% in 2018-2019, with males at 71 % and females at 49% [14]. Though the literacy rates have improved in Pakistan as a whole but cultural and tribal barriers continue to hinder education (especially in Sindh). The gender gap in education can be attributed to these barriers and women's education is still discouraged [15]. The overall literacy rate in Gilgit-Baltistan is 72% [16], while district Hunza can be singled out as having one of the highest literacy rates up to 95% in both genders as well as the highest literacy rate in Pakistan [17]. Since the use of conventional farming is quite extensive such as the use of high-yielding varieties and the application of synthetic fertilizers and pesticides have profited the farmers but detriments of the contemporary farming techniques are often ignored [18]. Awareness about the benefits of crop practices such as



intercropping and crop rotation was diminutive among the farming communities, which caused overuse of land and loss in soil fertility [20]. Upon discussing the matter with the respondents, they claimed that high-yielding varieties, the use of fertilizers and pesticides and conventional farming techniques resulted in high yields despite the small cultivation area [19]. Despite this, farmers were willing to opt for organic farming techniques that will ultimately enhance their yield profitability [1]. Regarding the price of organic products, several studies have shown that consumers of organic products show a greater willingness to pay than conventional consumers [21]. This way the organic products can be made more profitable and safer than conventional products, which significantly points in the direction of organic potential in the region [22]. However, they are still skeptical of whether organic produce will earn the same profits, owing to the small volume of organic produce. Yiridoe et al. [23] concluded that the demand for organic products depends on the price differential relative to conventionally grown alternatives, as compared to the actual price. It is recommended that the adoption of organic farming in GB is essential for farmers not only to increase income but also to change their awareness and attitude about farming techniques.

## Competing Interests

All authors read and approved the final version of the manuscript and declared that they have no conflict of interest.

## Author Contributions

All authors have participated in (a) conception and design, or analysis and interpretation of the data; (b) drafting the article or revising it critically for important intellectual content; and (c) approval of the final version as following Conceptualization, A.I.; Methodology, A.D. and Z.A.A.; Formal Analysis, R.M.K.; Investigation, A.D. and Z.A.A.; Data Curation, Z.A.A.; Writing-Original Draft Preparation, Z.A.A.; Writing-Review and Editing, A.D. and A.I.; Supervision, A.D.; Project Administration, A.I.

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